I. *A* Catoptric Microſcope. *By* Robert Barker, *M. D. F. R S.*

THOUGH *Microſcopes*, compos'd of Refracting Glaſſes only, have been vaſtly improved, as to their Effects of magnifying; yet they have been attended with ſuch great Inconveniences, that their Application to many Arts, in which they might be very convenient, is not ſo common as might be expected, and Mankind have reap'd but a ſmall Part of the Advantage obtainable from ſo ſurprizing and uſeful an Inſtrument.

Among the Inconveniences mentioned, theſe are the moſt conſiderable :

1. That in order to magnify greatly, it's neceſſary the Object-Glaſs be a Portion of a very minute Sphere, whoſe *Focus* being very ſhort, the Object muſt be brought exceeding near; it will therefore be ſhaded by the *Microſcope*, and not viſible by any other Light than what paſſes through itſelf; in this Caſe therefore, Opake Objects will not be ſeen at all.

2. Objects illuminated this way, may be rather ſaid to eclipſe the Light, than to be truly ſeen, little more being exactly repreſented to the Eye, than the Out-line; the Depreſſions and Elevations within the Out-line appearing like ſo many Lights and Shades, according to their different Degree of Thickneſs or Tranſparency; though the

 contrary

contrary happens in ordinary Viſion, in which the Lights and Shades are produced by the different Expoſure of the Surface of the Body to the incident Light.

3. Small Parts of large Objects cannot eaſily be applied to the *Microſcope*, without being divided from their Wholes, which in the Caſe of Vivi ſection defeats the Experiment, the Part dying, and no more Motion being obſerved therein.

4. The *Focus* in the *Dioptric Microſcope* being ſo very ſhort, is exceeding nice, the leaſt Deviation from it rendring Viſion turbid; therefore a very ſmall Part of an Irregular Object can be ſeen diſtinctly this way.

To remedy theſe Defects I have contrived a Microſcope on the Model of the *Newtonian* Teleſcope, in which I have been greatly aſſiſted by that excellent Workman, Mr. *Scarlet*, *jun.* I ſhall ſay nothing of the Effects of this Inſtrument, excepting that it magnifies from the Diſtance of 9 to 24 Inches, having the Honour of ſhewing this Inſtrument to this learned Society.

Explanation of the Figures.

Fig. 1. The entire Microſcope mounted on its Pedeſtal, on a proper Joint, contrived ſo as to direct the Inſtrument, towards any Object.

Fig. 2. The Section of the Inſtrument, in which A B is the larger concave metalline *Speculum*, C D the leſſer Concave metalline *Speculum*; E F a hollow Braſs Screw to faſten in the 1ſt Dioptrical Glaſs, or Plano

Plano-convex Lens ; G H another Screw faſtening on the hollow Cylinder E F I K (in which the Dioptric Glaſſes are contain'd) to the Body of the Microſcope ; I K a Cap with a ſmall Perforation, ſerving as an Aperture to the Eye-Glaſs, or 2d Lens (convex on both Sides) ; M L is a long Screw paſſing through the Nuts P and V, ſerving to bring the ſmall *Speculum* to a proper Diſtance from the larger ; N Q a ſliding Piece mov'd by the Screw, carrying the Stem Q R, and little *Speculum* C D; Y X a Screw for the Cap at *Fig.* 3 ; that at *Fig.* 4, is to be ſcrewed on the Aperture I K.

Fig. 5. Shews the Conſtruction of the Microſcope, in which *i* is an Object ſuppoſed erect ; from which Rays falling on the *Speculum a b*, will be reflected to the *Focus k*, where they will form an inverted Image, and being reflected by the ſmall *Speculum c d*, they will paſs through the Perforation of the great *Speculum*, and falling on the Plano-convex Glaſs *e f*, converge again, and form an erect Image at *l*; which being brought very near to the Eye, and ſo conſiderably magnified, will be diſtinctly ſeen through the Eye-Glaſs *g h*.

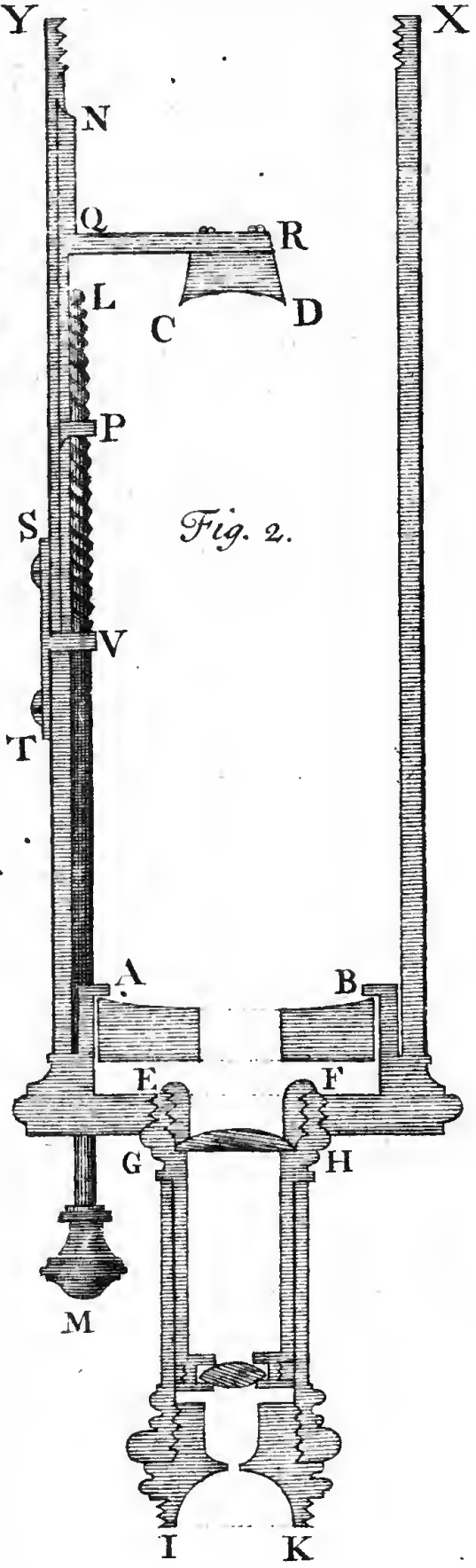

Fig. 2.

Fig. 3.

Fig. 4.

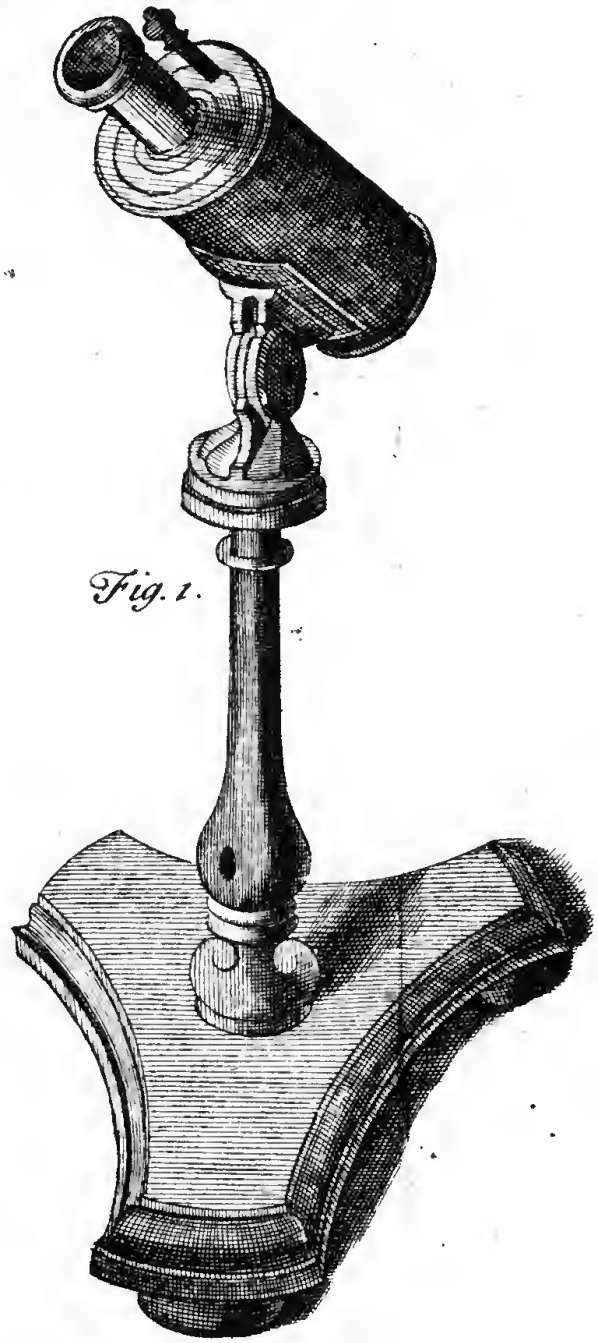

Fig. 1.

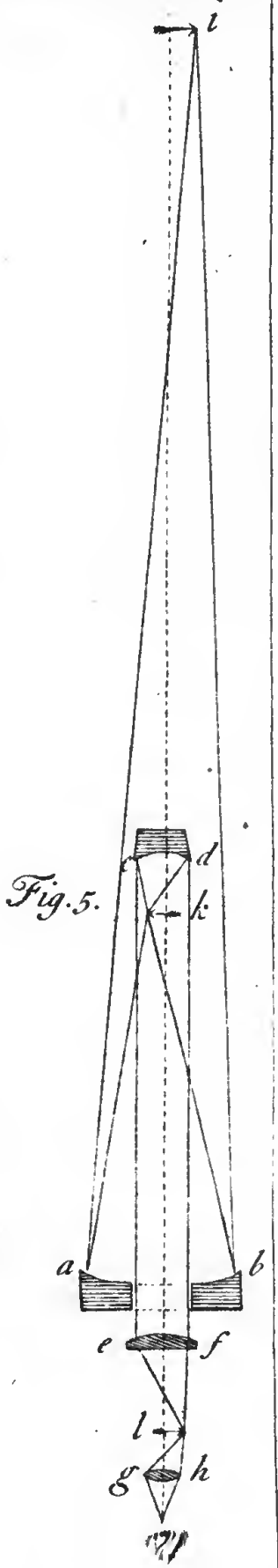

Fig. 5.